

## **Description of a new species of *Tityus* (Scorpiones, Buthidae) from Serra do Cipo in the State of Minas Gerais, Brazil**

Wilson R. LOURENÇO

Laboratoire de Zoologie (Arthropodes), Muséum National d'Histoire Naturelle,  
61 rue de Buffon, F-75005 Paris, France. E-mail: arachne@mnhn.fr

**Description of a new species of *Tityus* (Scorpiones, Buthidae) from Serra do Cipo in the State of Minas Gerais, Brazil.** - *Tityus adrianoi* sp. n., belonging to the *Tityus bahiensis* species group (Scorpiones, Buthidae) is described on the basis of one female specimen collected in the region of the Serra do Cipo, State of Minas Gerais, Brazil. Comments on the taxonomic position of the new species and on the environmental characteristics of the type locality are given. An identification key of the species belonging to the *Tityus bahiensis* group distributed in the Cerrados is provided. Some comments on their patterns of geographical distribution are added.

**Key-words:** Scorpiones - Buthidae - *Tityus adrianoi* sp. n. - Serra do Cipo - Cerrados - Brazil.

### INTRODUCTION

*Tityus* species which inhabit the Cerrados landscape formations of Central Brazil and belong to the *Tityus bahiensis* species group (as defined by Lourenço, 2002), have been the subject of several taxonomic studies in the last 20 years. Noteworthy among these species are: *Tityus fasciolatus* Pessôa and *Tityus charreyroni* Vellard (Lourenço, 1980); *Tityus stigmurus* (Thorell) and the related species *Tityus serrulatus* Lutz & Mello (Lourenço, 1981); *Tityus bahiensis* (Perty) and related species (Lourenço, 1982). In subsequent contributions, precise patterns of distribution and differentiation have been synthesised (Lourenço, 1986, 1994, 1996), and I assumed that the *Tityus* species living in the Cerrados were largely known. Several regions within the Cerrado formations of Central Brazil have been intensively surveyed, mainly in connection with scorpionism (Lourenço & Cloudsley-Thompson, 1996; Lourenço *et al.*, 1996). This is the case in particular for the states of Minas Gerais and Goiás.

The recent discovery and description of new *Tityus* species from the Cerrado formations of Central Brazil (Lourenço, 2001a,b) attests, however, that the inventory work is far from being complete. In the present paper a new species, *Tityus adrianoi* sp. n., belonging to the *Tityus bahiensis* species group, is described from a female specimen collected in the region of the Serra do Cipo, State of Minas Gerais. The Serra

do Cipo region is part of the Central Brazil Cerrado formations, and separates the Atlantic forest zone from the Cerrado region (Eiten, 1978, 1982). The taxonomic position of the new species, and the environmental characteristics of the type locality are discussed.

## RESULTS

### DESCRIPTION

#### *Tityus adrianoi* sp. n.

Figs 1-10

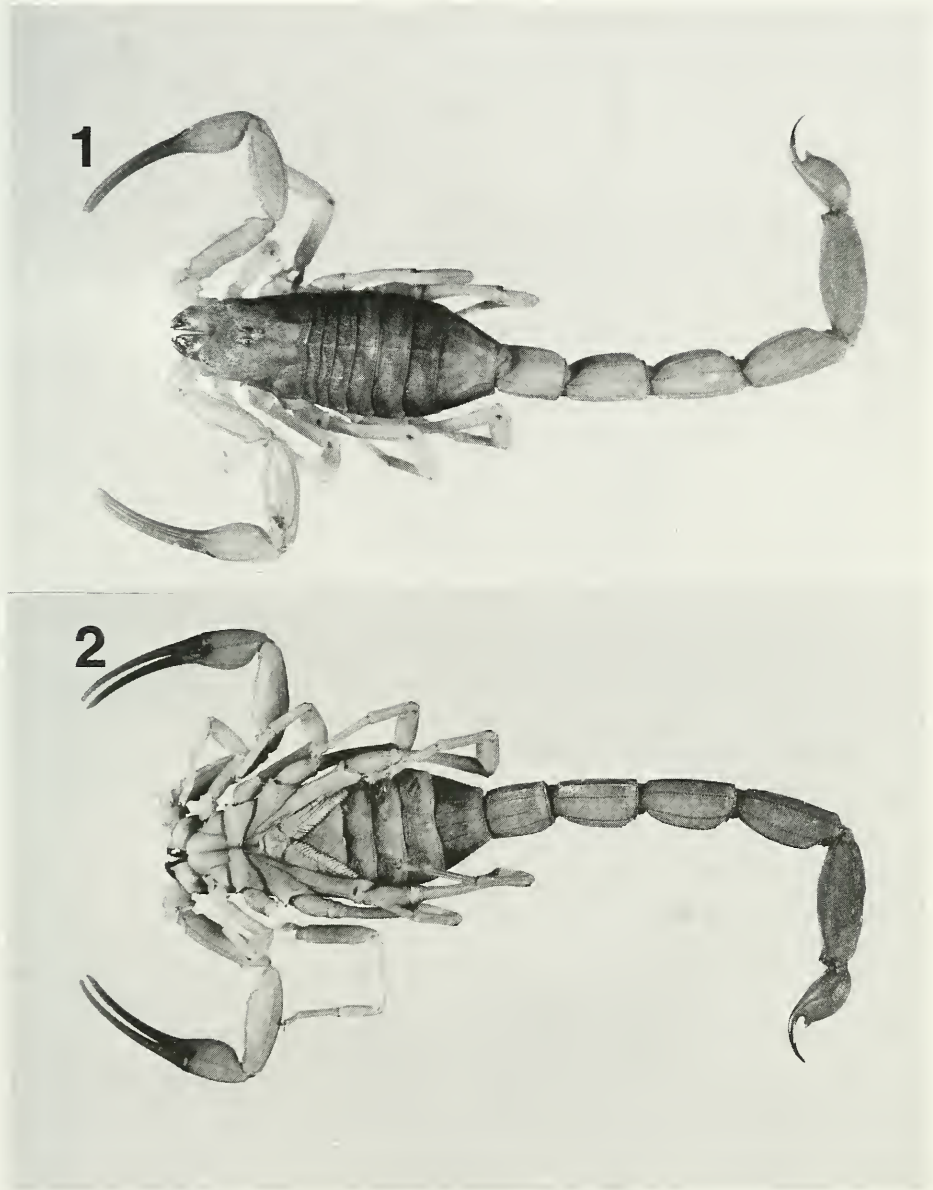
*Type.* Brazil, State of Minas Gerais, Serra do Cipo region (Campo Rupestre formation), female holotype, 28/III/1963 (J. Lacroix leg.), deposited in the Natural History Museum, Geneva.

*Etymology.* Patronym in honor of Dr Adriano Monteiro de Castro Pimenta of the Universidade Federal de Minas Gerais, Belo Horizonte, for his continuous interest in the study of scorpions.

*Diagnosis.* Scorpion of medium size, with 55 mm of total length. Coloration reddish yellow to yellowish, with the carapace and tergites blackish brown. Granulation strong throughout the body. Fixed and movable fingers of pedipalps with 15/16 rows of granules. All carinae complete. Pectinal teeth count 21.

*Description.* Coloration. Basically reddish yellow. Prosoma: carapace blackish brown in the anterior and lateral regions; the anterior region with an inverted triangular blackish spot stretching from the median eyes to the lateral eyes; regions behind the ocular tubercle and lateral eyes yellowish; eyes strongly marked with black pigment. Mesosoma: tergites I-VI blackish brown; tergite VII yellowish, with carinae brownish. Metasoma: segments I to IV yellowish; V reddish. Vesicle: same colour as segment V; extremity of aculeus darker than vesicle. Venter yellow. Chelicerae yellowish at their base; anterior region with variegated dark pigmentation; fingers dark reddish brown. Pedipalps: yellowish; fingers slightly reddish. Legs yellowish without any diffuse spots.

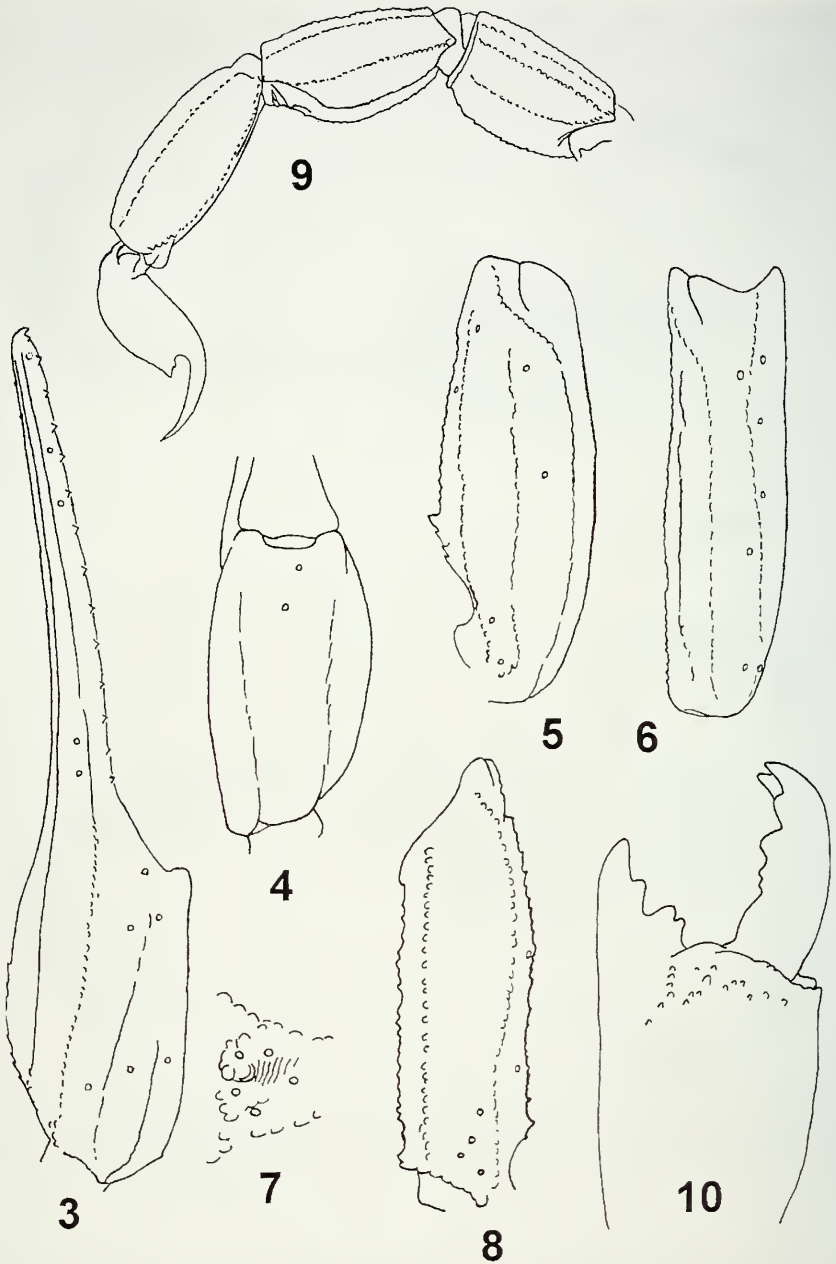
*Morphology.* Carapace moderately to strongly granular; anterior margin with a median concavity. Anterior median superciliary and posterior median carinae moderately developed. All furrows moderately deep. Median ocular tubercle anterior to the center of the carapace. Three pairs of lateral eyes. Sternum triangular. Mesosoma: tergites strongly granular. Median carina strong on all tergites. Tergite VII pentacarinata. Venter: genital operculum wider than long. Pectines: pectinal teeth count 21/21; basal middle lamellae of the pectines slightly dilated. Sternites with a fine granulation and with elongate stigmata; VI without keels; VII with 4 moderately developed carinae. Metasoma: segments I-II with 10 carinae; segments III-IV with 8 carinae; segment V with 5 carinae. Intercarinal spaces weakly granular. Telson with vestigial granulation on ventral and lateral surfaces and with a long and strongly curved aculeus; subaculear tooth strong and spinoid, with two dorsal teeth. Cheliceral dentition characteristic of the family Buthidae; ventral teeth on movable finger reduced and almost fused (cf. Vachon, 1963); ventral aspect of both fingers and of manus densely covered with long setae. Pedipalps: femur pentacarinata; patella with 7 carinae; chela with 9 carinae; all carinae moderately to strongly developed; entire surface



FIGS 1-2

*Tityus adrianoi* sp. n., female holotype. Dorsal and ventral aspects.

weakly granular. Fixed and movable fingers with 15/16 oblique rows of granules. Trichobothriotaxy; orthobothriotaxy A- $\alpha$  (Vachon, 1974, 1975). Legs: tarsus with numerous short fine setae ventrally.



FIGS 3-10

*Tityus adrianoi* sp. n., female holotype. 3-8. Trichobothrial pattern of pedipalp. 3-4. Chela, dorso-external and ventral aspects. 5-6. Patella, dorsal and external aspects. 7-8. Femur, detail of the internal aspect and dorsal aspect. 9. Metasomal segment III-V and telson, lateral aspect. 10. Chelicera.



Measurements (in mm). Total length 55.1. Carapace: length 6.6; anterior width 4.4; posterior width 7.3. Metasoma, segment I: length 4.6; width 3.5. Metasoma, segment V: length 8.4; width 3.3; depth 3.2. Vesicle: width 2.4; depth 2.5. Pedipalp: Femur: length 6.6; width 1.9. Patella: length 7.5; width 2.5. Chela: length 13.1; width 2.6; depth 2.4. Movable finger: length 8.8.

#### RELATIONSHIPS

The new species *T. adrianoi* sp. n. belongs to the *Tityus bahiensis* species group. In its general coloration pattern the new species shows affinities with *Tityus blaseri* Mello-Leitão from Chapada dos Veadeiros in the State of Goiás. Both species are known from localities in between 1000 and 2000 m altitude and they are isolated by the Cerrado formations (*sensu strictu*) of Central Brazil.

The following characters are distinctive:

- The pigmentation of carapace and tergites is intensely dark, almost blackish in the new species, whereas in *T. blaseri* it is yellowish brown.
- In the new species fixed and movable pedipalp fingers show 15/16 rows of granules, whereas *T. blaseri* possesses 17/18 rows.
- The new species has 21 pectinal teeth, whereas *T. blaseri* possesses 23-25.
- The basal middle lamella of the pectines is weakly dilated in the new species, but not dilated in *T. blaseri*.

The new species can also be easily distinguished from *Tityus bahiensis* (Perty) and *Tityus serrulatus* Lutz & Mello, both found in the State of Minas Gerais. All three species show different patterns of pigmentation. Moreover, the new species lacks posterior spinoid granules on the dorsal carinae of the metasoma (see Lourenço, 2002 for details).

#### ENVIRONMENTAL CHARACTERISTICS OF THE TYPE LOCALITY

The Serra do Cipo is part of the Cerrado formations of Central Brazil. According to Eiten (1978, 1982), the type of cerrado found in Serra do Cipo is the one defined as Campo rupestre (or rocky field). These occur on certain highlands and on mountain tops and ridges at moderate altitudes, usually between 1000 and 1800 m. These campos have very high species endemism. The soils are derived from special rock types, usually meta-quartzite (such as itacolomite), some also from fine grain ortho-quartzite, iron ore, etc. Soil derived from quartzites is a fine white or light gray sand, usually 10-30 cm thick, sometimes with humus. The bedrock usually outcrops in blocks so that the soil may vary in depth, humus content and drainage over distances of a few centimetres. The physiognomy of the vegetation may be low-tree and scrub woodland, open scrub, closed scrub, savanna or grassfield. According to Eiten (1978, 1982), the flora of the Campos rupestres can be divided into at least four categories. The Serra do Cipo region is characterised by species with a growth form typical of white sand campos in central Brazil and eastern Amazonia. This growth form is characterized by branches or their ends having closely-set, short, four-ranked leaves perpendicular to the stem, that is, they are squarrose or short-cruciate. Herbs, semi-shrubs and shrubs have this growth form; the larger woody plants have the same leaf-arrangement and a candelabra branching. Altogether, the plants are quite distinct from Cerrado plants.

KEY TO THE CERRADO SPECIES OF THE *TITYUS BAHIENSIS* GROUP

- 1 Metasomal segments III and IV with 1 to 5 granules modified as moderate or weak spines; coloration yellowish . . . . . 2
- (1) Metasomal segments III and IV without granules modified as spines; coloration from yellow to blackish brown . . . . . 3
- 2 One longitudinal dark stripe running over all tergites  
. . . . . *T. stigmurus* (Thorell, 1876)
- (2) Confluent spots on tergites . . . . . *T. serrulatus* Lutz & Mello, 1922
- 3 Coloration yellowish to reddish yellow with confluent pale brown or blackish spots . . . . . 4
- (3) Coloration generally dark, brown to blackish brown or with 3 dark longitudinal stripes on tergites . . . . . 5
- 4 Coloration reddish yellow with confluent pale brown spots; distribution: State of Goiás . . . . . *T. blaseri* Mello-Leitão, 1931
- (4) Coloration yellowish with confluent blackish spots; distribution: State of Minas Gerais . . . . . *T. adrianoi* sp. n.
- 5 Coloration brown to blackish brown; tergites dark brown; spots present on pedipalps and legs . . . . . 6
- (5) All tergites with 3 dark longitudinal stripes; spots present or absent on pedipalps and legs . . . . . 7
- 6 Coloration blackish brown; spots on pedipalps blackish; distribution: States of Minas Gerais and São Paulo . . . . . *T. bahiensis* (Perty, 1833)
- (6) Coloration brown; spots on pedipalps brown with small white circles; distribution: Federal District and the State of Goiás  
. . . . . *T. jeanvelliardi* Lourenço, 2001
- 7 Pedipalps and legs densely spotted; distribution: Federal District and the State of Goiás . . . . . *T. fasciolatus* Pessôa, 1935
- (7) Pedipalps and legs with spots reduced or absent . . . . . 8
- 8 Pedipalps and legs without spots; distribution: State of Mato Grosso do Sul . . . . . *T. trivittatus* Kraepelin, 1898
- (8) Pedipalps with reduced spots; legs with diffuse spots; distribution: western part of the State of Goiás . . . . . *T. charreyroni* Vellard, 1932

## BIOGEOGRAPHY

1. Most scorpion population of *Tityus* consist of monomorphic species. In the region of Cerrados two closely related species, *Tityus fasciolatus* Pessôa and *Tityus charreyroni* Vellard, occur in parapatry areas. A statistical study of traits, such as the patterns of pigmentation, showed no variability within either population. Moreover, pigmentation patterns within each population showed no variability during post-embryonic development. Therefore these species are clearly distinct. These two possible sibling species are both savannicolous, but they occupy different, quite specific microhabitats. *T. fasciolatus* is a termitophilous scorpion which lives exclusively in termite mounds built by *Armitermes euamignathus* Silvestri, whereas *T. charreyroni* lives under stones in a region west of that occupied by *T. fasciolatus* (Fig. 11). The

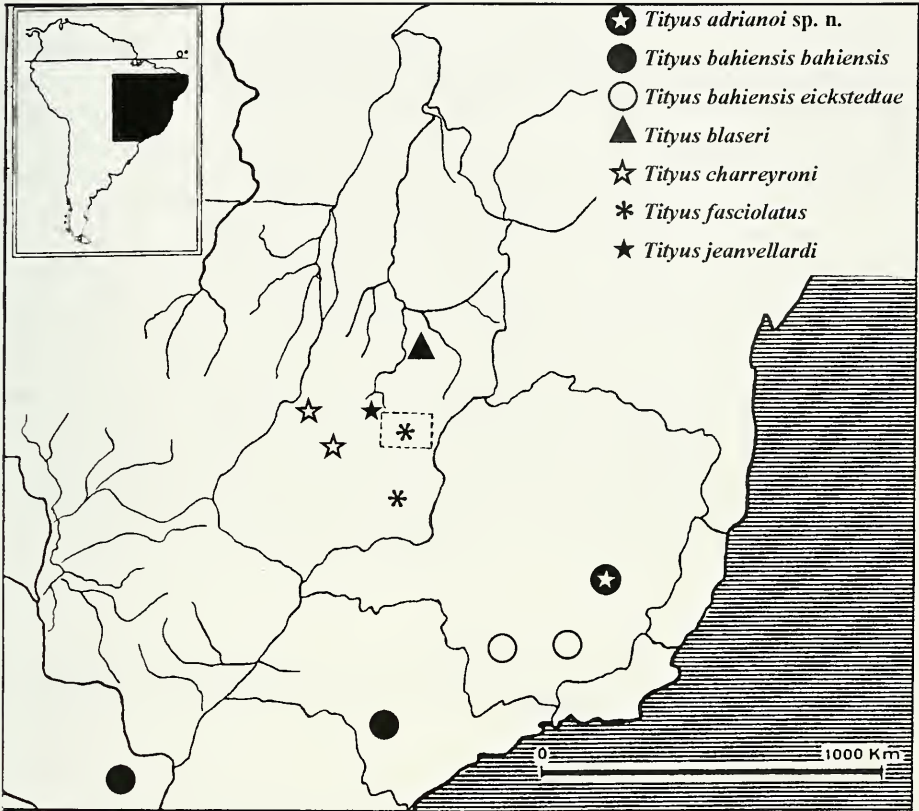


FIG. 11

Map showing the Central region of Brazil with the areas of distribution of some species discussed in this study.

occurrence of each species depends upon the presence of its specific microhabitat. *A. euamignathus* is associated with particular grasses, its staple food. With variation in the soil gradient, the vegetation also changes. Mounds of *A. euamignathus* are only present in association with a grass cover. When grass is no longer present, termite mounds and *T. fasciolatus* disappear. In areas where termite mounds are common, stones are rare, thus making the habitat unfavourable for *T. charreyroni*.

2. The study of *Tityus bahiensis* (Perty) (Lourenço, 1982), first suggested several morphological differences between northern and southern populations. This pattern was first interpreted as a multi-taxon situation by Lourenço (1982, 1994), with populations of different species and subspecies involved. This situation also illustrates the difficulties of clearly defining the biogeographic status of a given population. *T. bahiensis* is a very common species in the southeastern region of Brazil, and it represents an opportunistic species often living in disturbed habitats. Differences in the patterns of body pigmentation of individuals belonging to what appeared to be two

different allopatric populations first led to the recognition of two different species (Lourenço, 1982): *T. bahiensis* with a southern distribution and *T. eickstedtae* Lourenço, with a northern distribution. Moreover, additional data from the contact zone between the two populations indicated what could be interpreted as hybrid forms. More detailed studies, however, later suggested the existence of a single polytypic species (Lourenço, 1986) with two sub-species (and two sub-populations), one in the south (*T. bahiensis bahiensis*), the other in the north (*T. bahiensis eickstedtae*).

3. The biogeographic pattern presented by *Tityus adrianoi* sp. n. and by *Tityus blaseri* Mello-Leitão, suggests that these are allopatric species. The two species inhabit similar landscape formations of the type Campo rupestre which, however, belong to different categories according to Eiten (1978, 1982 – see also paragraph “Environmental characteristics of the type locality”). Besides, these two areas are separated by almost 1000 km of typical Cerrado vegetation which acts as a barrier. This present pattern of geographical separation of the two species could suggest that in past geological times a contact zone existed between the two populations. The present pattern of distribution of the two species may be the result of the palaeoclimatological vicissitudes in tropical South America during the late Cenozoic and the Pleistocene (Lourenço, 1996).

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